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“The Dust Properties of the Nearby Universe, in the Herschel Era”

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The electromagnetic emission from a galaxy contains information about the variety of physical conditions experienced in its interstellar medium. In star forming regions, particularly, most of the power is reradiated by dust grains in the infrared. The knowledge of the grain properties (their chemical composition, size distribution and abundances) is therefore crucial to interpret observations of star forming galaxies, nearby and distant. However, these dust properties are known to evolve with their environment, and this evolution is currently poorly constrained. In this talk, I will review several studies, based on Herschel observations of nearby galaxies, aimed at constraining several of these evolutionary processes.

After a general introduction, I will first discuss the general evolution of the dust content of galaxies, as a function of their elemental enrichment, comparing recent observations and theoretical models. Then, I will present the revision of the grain opacities that Herschel and Planck allowed us to reveal, in the Large Magellanic Cloud and in the Milky Way. Finally, I will present the modeling of spectral energy distributions with hierarchical Bayesian inference, and demonstrate its relevance for the study of infrared observations. I will show the application of this technique to derive maps of the dust properties in two massive star forming regions of the Magellanic clouds (LMC-N44 and SMC-N66).